

Interventions For Weight Reduction: Facing The Maintenance Problem

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Abstract

Behavioral treatments are perhaps the cornerstone of modern obesity treatment. Maintenance of weight lost via behavioral treatments has been less than hoped for, however. Weight regain is the result of complex interactions between physiological, behavioral, cognitive, and environmental factors; in this paper we review some of these factors and discuss current efforts to improve the long-term outcome of behavioral weight loss treatments. **Keywords:** Weight Loss, weight reduction, maintenance, obesity behavioral treatment programs.

Behavioral treatments for obesity, developed in the late 1960s and early 1970s, have been shown to be effective, at least over the shorter term. Behavioral weight loss treatment programs typically last 16-20 weeks, and individuals in these programs typically lose 5%-15% of their baseline weight (Anderson, Shapiro, & Lundgren, 2001; Jeffery et al., 2000; Wing, 2002), which is enough to improve health (National Heart, Lung, & Blood Institute, 1998). However, for most individuals, maintaining this weight loss over the long term is a struggle. It appears that body weight is highly resistant to long-term change (Heo, Faith, & Pietrobelli, 2002); numerous studies of behavioral treatment have found that most individuals reach maximum weight loss approximately six months after beginning treatment and regain the weight they lost within five years after treatment (Jeffery et al., 2000; Perri & Corsica, 2002).

The problem of weight regain is one of the most pressing in the treatment of adult obesity. It has been argued that, because adult weight tends to increase by a pound or two a year, an individual who loses weight but regains it after five years can be considered a treatment success because they would be expected to be 5 to 10 pounds heavier at that point if they had not undergone treatment (Brownell & Jeffery, 1987). While there may be some truth to this argument, it is of little consolation to those who struggle with weight regain. Moreover, the clinical relevance of weight loss appears to be related to how well a weight loss is maintained (Jeffery et al., 2000; Perri & Corsica, 2002).

Research on weight regain suggests that it is a complex process, with a number of factors interacting to make maintenance of weight loss difficult; it is clear that behavioral factors are only one part of a larger conceptualization of the factors affecting maintenance of weight loss and weight regain (Bray & Champagne, 2005; Perri & Corsica, 2002). In this review we will present this broad conceptualization of weight regain following behavioral treatment for weight loss as well as current interventions designed to overcome those factors. Our goal is to inform readers more familiar with more strictly behavioral perspectives of the complexity of these issues, and to place behavioral factors within this larger, more elaborate conceptualization of weight maintenance and weight regain. Accordingly, in this review we discuss the broad categories of physiological, cognitive behavioral, and environmental factors separately. We recognize, however, that there is considerable overlap among some of these categories (e.g., the behavioral and environmental domains).

Reasons for poor weight maintenance

Physiological explanations

A thorough discussion of the physiology and genetics of body weight regulation is beyond the scope of this paper (for detailed reviews, see: Chua & Leibel, 2002; Cupples, 2005; Loos & Bouchard, 2003; Price, 2002). It is clear, however, that obesity is partly genetically determined, although these genetic and physiological influences must interact with an “obesigenic” environment (discussed below) to

produce the epidemic levels of obesity seen today (Loos & Rankinen, 2005; Ravussin & Bogardus, 2000). Several physiological mechanisms also encourage weight regain after an individual loses weight, including reduced metabolic rate and thermogenesis, as well as altered feeding-related hormone levels (Cupples, 2005; Dulloo, Seydoux, & Jacquet, 2004; MacLean, 2004; Levin, 2004; Stubbs et al., 2004). This is likely because humans evolved under conditions where starvation was a more pressing problem than an overabundance of food; therefore, it appears that many people may simply not be physiologically or genetically equipped to deal with our current food environment.

Cognitive explanations

A number of studies have found that obese individuals undergoing weight loss treatment have unrealistic expectations about how much weight can be lost through non-surgical means. While behavioral and pharmacological interventions generally result in a loss of 5%-15% of baseline weight (National Heart, Lung, and Blood Institute, 1998; Wing, 2002), obese treatment-seekers typically report goal weights that would necessitate losses of more than double this amount (Foster, Wadden, Phelan, Sarwer, & Sanderson, 2001; Foster, Wadden, Vogt, & Brewer, 1997; Masheb & Grilo, 2002; O'Neil, Smith, Foster, & Anderson, 2000).

It has been suggested that these unrealistic expectations play a role in the abandonment of weight loss efforts and contribute to weight regain; essentially, the large discrepancy between what is deemed a disappointing weight loss and the amount of effort expended to lose the weight is evaluated unfavorably, which leads to discouragement and an abandonment of weight control efforts (Foster et al., 1997; Linde, Jeffery, Finch, Ng, & Rothman, 2004; Perri & Corsica, 2002). If correct, this suggests that beliefs about weight loss may play an important role in weight maintenance.

Behavioral explanations

Behavioral treatment programs emphasize teaching the skills necessary for weight loss; however, weight maintenance involves a different set of behavioral skills (Wadden, 1995). For example, although weight loss is possible using a variety of diet and exercise patterns, successful weight maintainers tend to adopt similar behaviors following weight loss such as eating a low-fat, low-calorie diet and adopting high levels of physical activity (Klem, Wing, McGuire, Seagle, & Hill, 1997; McGuire, Wing, Klem, Seagle, & Hill, 1998). Exercise, in particular, seems to play a much greater role in weight maintenance than weight loss (Blair & Leermakers, 2002; Pronk & Wing, 1994). Unfortunately, teaching individuals to successfully transition from the skills for weight loss to those for weight maintenance has traditionally not been emphasized (Cooper & Fairburn, 2001; Perri, 1992). This may be one reason for the common finding that adherence to weight maintenance practices tends to lessen over time, setting the stage for weight regain (Jeffery et al., 2000; Perri & Corsica, 2002).

The context of weight maintenance is also different from weight loss (Wadden, 1995). Weight loss efforts are usually time-limited (e.g., "going on a diet" to lose 20 pounds), while weight maintenance is an ongoing, lifelong process. Also, although enjoyable (Klem, Wing, Lang, McGuire, & Hill, 2000), weight maintenance may not be as reinforcing as weight loss. For example, the social reinforcement that often accompanies weight loss (e.g., "You look great!") is typically absent during long-term maintenance. This continued effort for relatively little reinforcement may also lead to the reduction in weight practices over time.

In conclusion, a broad range of behavioral factors, ranging from a lack of skills to maintain weight loss to a gradual loss of reinforcement for maintenance, may result in the abandonment of weight

control behaviors over the long term. However, as we will discuss below, maintenance of weight control behaviors is one of the most critical factors in long-term weight maintenance.

Environmental explanations

There is a growing consensus that many of the problems in the prevalence of obesity and the difficulty of weight maintenance are due in part to the fact that our current environment does not support weight loss and weight maintenance. The current situation in the US and many other countries is one in which low-cost, high fat food is readily available in large portion sizes and minimal physical activity is required in daily life. This so-called “toxic” or “obesigenic” environment is thought to provide a powerful set of contingencies that drive energy intake up, energy expenditure down, and make it extremely difficult to engage in effective weight loss and weight maintenance behaviors (Brownell & Horgan, 2003; Henderson & Brownell, 2004; Horgan & Brownell, 2002; Peters, Wyatt, Donahoo, & Hill, 2002; Poston & Foreyt, 1999).

Several lines of evidence support the toxic environment hypothesis. For example, the increase of obesity in the US (Flegal, Carroll, Ogden, & Johnson, 2002) has happened too rapidly to be the result of any genetic changes in the human organism; however, it does parallel a number of rapid changes in the environment during that same time, including an increase in standard portion sizes (Young & Nestle, 2002), an increase in the consumption of sweetened beverages (Nielsen & Popkin, 2004), and a probable decrease in physical activity (Blair & Leermakers, 2002). There is also evidence that as other countries’ diets and activity patterns “Americanize,” they also begin to see significant rises in rates of obesity (Henderson & Brownell, 2004; Poston & Foreyt, 1999). Laboratory and analogue studies of nonhumans (Tordoff, 2001) and humans (Levitsky, 2002; Levitsky & Youn, 2004; Rolls, Morris, & Roe, 2002) also have shown that environmental and food-related cues can overwhelm physiological mechanisms related to food intake. Thus, the current environment likely plays a significant role in the difficulty most individuals have maintaining weight loss.

Improving the long-term outcome of weight loss treatment

Physiological interventions

While it is not currently possible to directly change one’s genetic makeup, the genetic and physiological factors affecting weight regain can be manipulated through pharmacological and surgical treatments. These treatments have been available as alternatives or adjunct to behavioral treatments for decades; we review their current status briefly below.

Long-term pharmacotherapy for obesity is widely considered to be a viable option for assisting with weight maintenance. While existing medications do not provide greater weight loss than behavioral treatment, long-term maintenance using pharmacotherapy has generally been better than that of behavior therapy, with some agents showing clinically significant loss and maintenance (i.e., 5-10% of initial weight) for up to two years as long as individuals remained on medication (Wadden & Osei, 2002). Furthermore, combining pharmacotherapy and behavior therapy may result in better maintenance than using either alone (Wadden & Osei, 2002). Pharmacotherapy for obesity may work in part by reducing the desire to initiate or continue eating, which might make it easier to use the skills taught in behavioral treatments (Wadden & Osei, 2002). Thus, pharmacotherapy may be a useful adjunct to behavioral interventions for weight loss and weight maintenance.

Morbidly obese individuals (i.e., BMI 40 kg/m^2) have traditionally fared poorly in behavioral weight loss interventions. For them, the 5-15% of weight loss obtainable through behavioral means

generally represents an amount too small to have clinically significant results. However, surgical procedures have shown great promise in the maintenance of weight loss for this group. Current surgical procedures are generally safe, with a mortality rate of less than 1%, and result in losses of approximately 50-70% of excess weight (Christou et al., 2004). With current procedures this loss is usually well maintained over several years and results in significant long-term improvements in weight-related comorbidities and mortality (Christou et al., 2004). While it is only appropriate for individuals who are severely obese, bariatric surgery is likely to be the only treatment that leads to long-term maintenance in this group.

Cognitive interventions

As noted previously, several studies have found that obese individuals trying to lose weight have unrealistic expectations of how much weight they will lose, and it has been hypothesized that these expectations play a role in the abandonment of weight maintenance strategies. Accordingly, there has been some recent emphasis on modifying unrealistic expectations in order to improve long-term weight maintenance. To date, however, interventions designed to moderate these expectations have shown limited efficacy at best. For example, Cooper, Fairburn and colleagues have developed a comprehensive cognitive-behavioral treatment of obesity that, in addition to the usual components of behavioral weight loss programs, emphasizes modifying unrealistic cognitions concerning weight loss and weight regain (Cooper & Fairburn, 2001; Cooper, Fairburn, & Hawker, 2003). They have not provided long-term outcome data on their program, however. Wadden and colleagues (2003) found that a minimal intervention (i.e., merely informing individuals of how much weight loss to actually expect) had no effect on weight loss expectations. Longer and more intensive interventions have produced significant improvements in weight loss expectations and overall self-esteem but have not improved weight maintenance at follow-up (Ames et al., 2005; Foster, Phelan, Wadden, Gill, Ermold, & Didie, 2004). There is also some evidence that unrealistic expectations may not be as harmful as previously supposed. Linde and colleagues (2004) found that unrealistic weight loss goals did not have a detrimental impact on psychosocial adjustment and had no impact on weight maintenance. In fact, in a followup study unrealistic weight loss goals predicted better maintenance than more reasonable goals in women (Linde, Jeffery, Levy, Pronk, & Boyle, 2005).

Thus, it appears that cognitive interventions focused on changing weight loss expectations may not be as effective as expected and unrealistic expectations may not actually be harmful to maintenance efforts. Further research is needed to clarify these results and determine what, if any, benefit cognitive interventions may add to behavioral treatments for weight loss and weight maintenance.

Behavioral interventions

A number of behavioral interventions have been developed to improve weight maintenance, including extending the length of treatment through continued groups (either professional or peer-led), providing reminders and prompts via mail or telephone, providing incentives for maintenance, training participants in relapse prevention strategies, and increasing physical activity (see Jeffery et al., 2000, and Perri & Corsica, 2002 for detailed reviews). To date, the most successful strategies appear to be related to increasing the length of treatment, and there is increasing recognition that obesity requires ongoing care for maintenance to be successful (Bjorvell & Rossner, 1992; Jeffery et al., 2000; National Heart, Lung, & Blood Institute, 1998; Nonas, 1998; Perri & Corsica, 2002).

Continued adherence to changes in diet and activity appear to be the mechanism underlying the efficacy of continued care (Jeffery et al., 2000; Perri & Corsica, 2002). Studies of the National Weight Control Registry, a database of individuals who have lost at least 30 pounds and maintained their weight

loss for at least 1 year (Klem et al., 1997), suggest that individuals who maintain weight loss continue to consistently eat a low-fat, reduced calorie diet of approximately 1,400 kcal/day and expend roughly 2,800 kcal/week through exercise (Gorin, Phelan, Wing, & Hill, 2004; Klem et al., 1997; Klem, Wing, Ho Chang, et al., 2000; McGuire, Wing, Klem, & Hill, 1999; McGuire et al., 1998). An emphasis on continued adherence is critical because, as noted earlier, adherence tends to fall over time (Jeffery et al., 2000; Perri & Corsica, 2002), and recovery from even minor weight regain is uncommon (Phelan, Hill, Lang, Dibello, & Wing, 2003).

From a behavioral perspective, continued care can facilitate adherence in two ways. First, regular meetings with a professional can act as a cue to continue appropriate behavior. Many patients report that knowing that they will attend a meeting to discuss their behavior reminds them to "do the right thing" between groups. Other forms of contact, such as mailings or email messages, can act in much the same way. Second, the group leader can reinforce behavior necessary for weight maintenance. Finally, the group structure allows for the continuation of social reinforcement for maintenance even as it decreases from other sources such as family and friends. In conclusion, behavioral programs that increase long-term adherence to maintenance behaviors are a key to improving the maintenance of weight loss.

Environmental and Public Health Interventions

Given the pervasive influence of the environment on eating behavior, physical activity, and obesity, environmental interventions are an absolute necessity for weight maintenance. In fact, it has been argued that long-term weight maintenance is a practical impossibility for most individuals without significant environmental change (Brownell & Horgan, 2003; Horgan & Brownell, 2002; Lowe, 2003). Environmental interventions can be conceptualized on two levels; individual interventions and public health interventions.

Individual environmental interventions will be readily appreciated by most behaviorally-oriented clinicians. Examples of this approach include antecedent control techniques such as limiting access to one's favorite calorie-dense foods and minimizing opportunities for between-meal snacking. The goal of these interventions is to help the individual develop a "mini-environment" that supports the behavioral changes he or she is trying to make, as the larger environment does not support weight maintenance. These strategies are commonly taught in behavioral weight loss programs and can be easily extended into the context of weight maintenance.

While individual-level interventions may be effective, the sheer scope of the current obesity epidemic requires that large-scale public health interventions and public policy changes be implemented to reduce the incidence and prevalence of the problem (Jeffery, 2002; Horgan & Brownell, 2002; Koplan & Dietz, 1999; Kumanyika, Jeffery, Morabia, Ritenbaugh, & Antipatis, 2002). Suggested public health interventions include: regulating the energy density of foods, reducing the package size of foods, improving nutrition labels, restricting the promotion and advertising of calorie-dense foods, controlling the sale of energy-dense foods to certain groups (e.g., children), raising the price of energy-dense foods, encouraging physically active lifestyles, and improving public health education (Jeffery, 2002). Many of these public health interventions are likely to require public policy interventions such as changing relevant laws before they will be adopted. Horgan and Brownell (2002) suggest policy changes such as: providing resources for physical activity through subsidies and incentives, regulating food advertising directed at children, banning food advertising in schools, prohibiting the sale of fast foods and soft drinks in schools, subsidizing healthy foods, and taxing unhealthy foods. It has also been suggested that physical activity can be increased by changing the built environment, such as changing the design of suburban neighborhoods to include more sidewalks and stores within walking distance (Booth, Pinkston, & Poston, 2005).

Clearly, the public health and public policy interventions mentioned above face opposition from a number of industries and lobbying groups, and may be difficult to enact. The success of recent tobacco legislation, however, provides some evidence that large-scale public health changes can be effected. Also, large-scale shifts in food availability can be brought about through consumer demand; the rapid proliferation of low fat products in the 1980s and low carbohydrate products in the past few years can be attributed to consumer demand for these products. Thus, there is some hope that the larger environment can be modified to become more amenable to prevention of weight gain and the encouragement of weight loss and weight maintenance.

Conclusions

Weight regain is the result of complex interactions between physiological, cognitive, behavioral, and environmental factors. In recent years, behaviorists have begun to understand and include these factors into their analysis of the weight regain problem. This broader focus will hopefully enable the field to improve long-term outcome of obesity treatment. In particular, the use of behavioral techniques to improve adherence and change the environment to support weight maintenance can support public health, pharmacological, and other interventions. In this way, we can improve upon the generally modest success the field has shown in helping individuals avoid weight regain and maintain weight loss over the long term.

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1/4 Page: \$50.00 1/2 Page: \$100.00 Full Page: \$200.00

If you wish to run the same ad in multiple issues for the year, you are eligible for the following discount:

**1/4 Pg.: \$40 - per issue
1/2 Pg.: \$75 - per issue
Full Page: \$150.00-per issue**

An additional one time layout/composition fee of \$25.00 is applicable

**For more information, or place an ad, contact Halina Dziewolska by phone at (215) 462-6737 or e-mail
at: halinadz@hotmail.com**